

OPERATING INSTRUCTIONS



Digital Battery Tester

Safety Precautions

When Working on Vehicles

- Always wear approved eye protection.
- Always operate the vehicle in a well-ventilated area. **Do not inhale exhaust gases—they are very poisonous!**
- Never smoke or have open flames near vehicle. Vapors from gasoline and charging batteries are highly flammable and explosive. Always keep a fire extinguisher suitable for gasoline/electrical/chemical fires handy.
- Always keep yourself, tools, and test equipment away from all moving or hot engine parts.
- Never lay tools on vehicle battery. You may short the terminals together, causing harm to yourself, the tools, or the battery.
- Always turn ignition key OFF when connecting or disconnecting electrical components, unless otherwise instructed.
- Keep away from engine cooling fan. On some vehicles, the fan may start up unexpectedly.
- Never leave vehicle unattended while running tests.
- Always make sure the vehicle is in **Park** (automatic transmission) or **Neutral** (manual transmission) and that the **parking brake** is firmly set. Block the drive wheels.
- **Always** follow vehicle manufacturer's warnings, cautions, and service procedures.

Additional Precautions When Testing

- Discharged batteries will freeze. Store batteries above 32°F (0°C) or maintain battery in a charged condition.
- Lead-acid batteries contain sulfuric-acid as the electrolyte. The electrolyte is extremely corrosive and evolves oxygen and hydrogen during charging, which can ignite and cause an explosion. Ventilate area and keep flames and sparks away from charging battery. Follow the manufacturer's charging procedures.
- If electrolyte contacts skin, immediately rinse with water. If electrolyte contacts eyes, flush eyes with water and contact physician. When handling batteries, wear eye protection, chemical resistant gloves and protective clothing.

DISCLAIMER!

Due to inherent dangers associated with automotive maintenance procedures, the manufacturer and all parties involved with the distribution and/or sale of this equipment will not be held liable or responsible, either wholly or in part, for any injury, damage or claims resulting in its performance or the use of the instructions contained in this manual.

DIGITAL BATTERY TESTER

The Digital Battery Tester is a hand held, diagnostic tool designed to test 12V (volt) lead-acid type batteries rated from 125 to 1400 CCAs (Cold Cranking Amps). The tester will evaluate the battery, starting system, and charging system. Also, it can be used as a voltmeter with an input range of 7.0V to 32V.

The tester is powered by the battery under test. Fully and partially charged batteries can be tested as long as at least 7.0V is present and enough charge exists to power the tester. The battery may remain connected to the vehicle, as long as the vehicle's electrical system does not interfere with testing. Special circuitry protects the tester from reverse polarity connections.

Test results (messages and voltage readings) are displayed on a 4 digit-character LED display. Voltage measurements are displayed to two decimal places. The test cable is permanently attached to the tester and contains separate load and monitor wires for accurate measurements. Four keys allow the user to operate the tester:

- **Arrow (↑ ↓)** keys: Adjust the CCA value and select CCA standard.
- **Test** key: Performs the battery test for temperatures above 32°F (0°C) and is used as ENTER key for storing the CCA standard.
- **Cold Test** key: Performs the battery test for temperatures at or below 32°F (0°C). Also is used to enter the mode that allows the CCA standard to be changed.
- After pressing on of the test keys, any of the keys can be used to step through the test sequence.

Note: Before testing, read all Safety Guidelines.

Test Preparation

Multi-Battery Systems

In multiple battery systems (multi-bank systems), each battery must be tested separately. Batteries in multi-bank systems can be connected in series, parallel or a combination of both. *Only* batteries connected in series may remain connected during test. Batteries connected in parallel must be disconnected and electrically isolated from each other.

Series Connection - In **Figure 1a**, any number of batteries can be connected in series; the negative (-) terminal of one battery connects to the positive (+) terminal of the other. Only the negative terminal of the first battery and the positive terminal of the last battery are connected to the vehicle.

Parallel Connection - In the parallel connection of **Figure 1b**, any number of batteries can be connected parallel: All the negative (-) terminals are connected together and all the positive (+) terminals are connected together. Since each battery must be tested separately, the batteries must be disconnected and electrically isolated from each other.

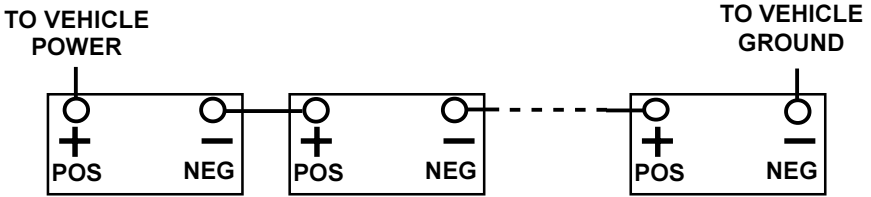


Figure 1a Series Connection

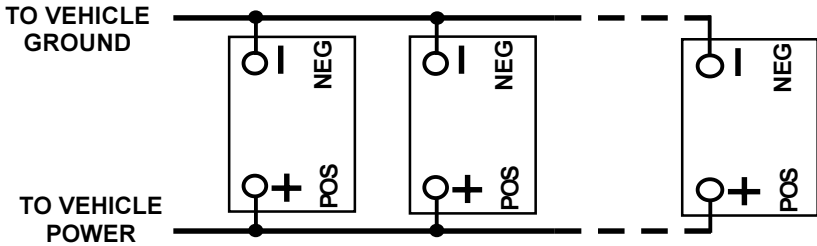


Figure 1b Parallel Connection

Vehicle Battery

1. Turn ignition key OFF, not in the ACCESSORIES position as shown in **Figure 2**. Engine needs to be OFF and all electrical loads must be removed from the battery for proper testing. Refer to the vehicle operator and service manual if loads still exist.
2. If battery is being charged, then stop, turn charger OFF and disconnect clamps or leads. The battery cannot be accurately tested while being charged. Performing a Battery Test with the charger connected will display a FAIL condition.
3. The connections must be clean and must make good contact to achieve correct test results.
4. On **side-post type** batteries, install terminal stud adapters. These are not included, but are available at most automotive parts stores.

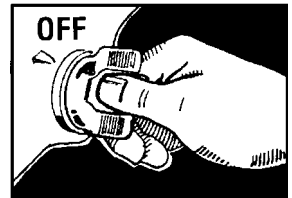


Figure 2 Ignition OFF

Faulty Connection

1. Once tester is ready, if a connection loses continuity, then a message will identify the clamp that has a bad connection: Red (**rd**) or Black (**bl**).
2. If the connections are good and the tester is not ON, then the battery voltage is below 7V.
 - Disconnect tester and charge battery. Follow battery charger manufacturer's instructions for proper battery charging procedures.



WARNING!

Charging a battery with a bad cell may cause severe personal injury and damage to vehicle and/or equipment.

- Disconnect charger and reconnect the tester. If the LED display does not illuminate, then the battery is not accepting a charge and should be replaced.

Tester Start-up

1. Connect the tester's black clamp to the negative (-) battery terminal and the red clamp to the positive (+) battery terminal. Make sure both jaws make good contact. If required, rock clamps back and forth to improve connection.
2. The tester begins to initialize. The LED display will turn on to verify that it is operating correctly.
3. During the initialization period, the tester checks the battery for high voltage, sufficient charge, and bad cells. If the checks pass, then the tester continues with the initialization. If any of these checks fail, testing stops and one of the following messages will display:
 - *Hi/xx.xx* - The message "Hi" and battery voltage alternate on the display indicating the voltage is too high for a 12V battery. Check the following:
 - No battery charger and loads are connected to the battery.
 - Engine is OFF, not in the ACCESSORIES position.
 - Unit is testing a single 12V battery.
 - *Ch/xx.xx* - The message "Ch" and battery voltage alternate on the display indicating the battery is discharged and needs to be charged. Disconnect the battery tester, charge the battery, and reconnect battery tester.
 - *BAD/CELL* - The messages "BAD" and "CELL" alternate on the display to indicate that there is a shorted or defective cell(s) in the battery. Battery should be replaced.
4. After the battery passes the initial checks, the CCA standard presently set in the tester will display, followed by a CCA value (default or the previously selected). The CCA standard can be changed when powering up the tester as explained in the next section.



CCA Value - The CCA value indicated on the tester should be the same as the rated CCA printed on the battery. The CCA value displayed can be increased or decreased by steps of 5 using the arrow (↑ ↓) keys. Holding down an arrow key will change the values faster.

Note: *Do not confuse CA rating with CCA rating - Always use CCA rating. To convert CA or MCA (marine) to CCA, multiply CA or MCA by 0.8.*



Selecting Battery CCA Measurement Standard

The tester is factory set to the SAE (Society of Automotive Engineers) measurement standard that rates vehicle batteries sold in the U.S.

Other measurement standards the tester uses are:

DIN - Deutsches Institut für Normung; German national standard

IEC - International Electrotechnical Commission standard

EN - European Norm measurement standard

BCI - Battery Council International standard.

To change the measurement standard:

- Hold down **COLD TEST** key while connecting the tester to the battery.
- Use arrow keys to select the CCA standard of measure. The SAE standard is at the top of the list and the BCI standard is at the bottom.
- Press the **TEST** key to store the setting and then disconnect the tester from the battery. This standard will be used until changed.

Battery Test

1. Press the **TEST** key for testing above 32°F (0°C), or **COLD TEST** key for testing at 32°F (0°C) or lower (actual battery temperature).
2. While the tester checks the battery, the display will show - - - -. After approximately 10 seconds, the tester will display one of four results:

PASS means the battery is in good condition, no problems detected.



FAIL means a problem was detected and the battery needs to be replaced. Check the following before replacing the battery. Retest if fault was detected.



- Battery clamps are securely fastened to the terminals.
- Terminals are clean and free of debris for a good electrical continuity.
- If the battery was connected to the vehicle during test, perform the following steps:
 - Disconnect the battery from the vehicle.
 - Clean battery posts or terminals.
 - If a side-post type battery is being tested, verify the terminal stud adapters are screwed in tightly.
 - Reconnect tester and retest. If tester still indicates a bad battery, then replacement is required.

CH means the battery is discharged too low to test and must be charged before testing. Disconnect tester, charge battery and retest. If "CH" displays again after recharging, then the battery is bad and should be replaced.



SF.CH means a surface charge was detected on the battery as a result of charging. When this condition exists, the CCA reading may not be accurate. Remove the surface charge by applying a load to battery.



- Turn headlights ON for 60 seconds, then off.
 - Wait at least 60 seconds for the battery voltage to stabilize.
 - Reconnect tester and retest battery. If the surface charge still exists, then repeat the loading procedure and retest. Some battery designs require more time to remove surface charge and stabilize.
3. Press any key to continue. The battery voltage will display.
 4. Press any key again and the tester will measure the CCA and display the result in about 5 seconds. While the CCA is being measured, the display will show - - - - . The CCA is the available battery power at its present temperature and state of charge.



Note: A new battery, when fully charged and at 70°F (21°C), will have a CCA rating that is greater than CCA rating on the battery label.

If the measured CCA is greater than the tester's limit of 1400, then 1400 will blink. If the measured CCA is below the tester's limit of 125, then 125 will blink.



Though a battery may pass the initial battery checks (Pass/Fail), The CCA test may detect it still needs charging. If this occurs, the tester will display the CCA value and CH in alternating fashion.

If noise was detected during the test, a steady decimal point (.) will be displayed. This indicates that the CCA number may be inaccurate. Verify the engine is OFF and remove ALL accessory loads during the test. If the problem remains, disconnect the battery from the vehicle (remove cables on terminals) and retest.

5. Press any key to return to the first screen to perform a test or disconnect clamps from the battery.

Starting Test

1. Connect the tester's black clamp to the negative (-) battery terminal and the red clamp to the positive (+) battery terminal.
2. Press the **TEST** key and wait for the tester to respond with PASS, FAIL, CH or SF.CH.
3. Once the battery test result appears, press any key to place the tester in the voltmeter mode.

Note: Pressing another key will initiate the CCA measurement and you will have to start over!

4. Disable the vehicle's ignition system to prevent the engine from starting. Refer to the vehicle service manual for instructions.
5. While watching the tester's display, crank the engine for 5 seconds.
 - A healthy starting system, *with a good, fully charged battery*, should read above 9.60V during the cranking period.
 - Readings below 9.60V **may** indicate a problem somewhere in the starting system. Refer to the vehicle's service manual for troubleshooting procedures.
6. To return to the first screen, press any key to run the CCA test and then press any key again. Otherwise, disconnect clamps from battery.



Charging Test

1. Connect the tester's black clamp to the negative (-) battery terminal and the red clamp to the positive (+) battery terminal.
2. Press the **TEST** key and wait for the tester to respond with PASS, FAIL, CH or SF.CH.
3. Once the battery test result appears, press any key to place the tester in the voltmeter mode.

Note: *Do Not press another key again until Charging Test is done. Pressing another key will measure the CCA and you will have to start over!*

4. Start the vehicle and run engine at no-load/curb-idle. The voltage displayed on the tester should be between 13.25V and 15.50V.
5. Rev engine at no-load/fast-idle (~2000 rpm). The voltage displayed on the tester should be between 13.25V and 15.50V.
6. **Do not** observe the voltage at full-load/curb-idle. The charging system performance is marginal here.
7. A healthy charging system should maintain readings between **13.25** and **15.5** volts. Readings above or below **may** indicate a problem somewhere in the charging system.
6. To return to the first screen, press any key to run the CCA test and then press any key again. Otherwise, disconnect clamps from battery.

